Convergence Bidding Issues

Frank A. Wolak
Market Surveillance Committee

California ISO
Your Link to Power

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Background for Presentation

- FERC has ordered CAISO to implement convergence or virtual bidding within twelve months after start of MRTU
- A number of design elements have been largely settled
  - Same load distribution factors (LDFs) for virtual and physical bids
  - Market monitoring capabilities
    - DMM must be able to re-run market with and without virtual bids
- Major unsettled design elements
  - Granularity in virtual bids (LAP level versus nodal level)
  - Cost allocation to virtual versus physical transactions
- Outstanding design question—If nodal virtual bidding is ultimate goal, what is best way to start with virtual bidding?
  - LAP level without position limits
  - Nodal level with position limits

Outline of Presentation

- Goals of Convergence Bidding
  - Price convergence between day-ahead and real-time
    - Convergence => Expected price difference = 0
      - Realized price differences cannot be predicted
  - Congestion convergence between day-ahead and real-time
  - Reduce total costs to serve load
- Benefits and costs of greater granularity
  - Market efficiency benefits
  - Potential for increased unilateral market power
    - Outstanding design issues for greater granularity
- Benefits and costs of allocating costs to virtual bids
  - Market efficiency benefits versus equity concerns
- Proposed transition mechanism
  - Nodal virtual bids with position limits and low transactions costs

Goals of Convergence Bidding (CB)

- Limit deviations between day-ahead (DA) and real-time (RT) prices
- If expected value of P(RT) equals P(DA) and difference not predictable using publicly available information
  - Suppliers will schedule and bid generation units in least cost manner because they expect to receive same price from DA and RT markets
  - Reduce variance in (P(DA) – P(RT))
- Limit ability of market participants to move market prices through unilateral actions
  - Many convergence DEC and INC bids around market clearing price makes it more difficult for any individual bidder to move market prices

Goals of Convergence Bidding (CB)

- Limit deviations between day-ahead and real-time congestion charges
  - Difference between prices at locations A and B in DA market equals difference expected between these prices in RT market
- If expected value of P(RT,A) – P(RT,B) equals P(DA,A) – P(DA,B)
  - Suppliers and loads will schedule and bid in least cost manner because they expect to bear same congestion charge in DA and RT markets
  - Reduce variance of [(P(DA,A)–P(DA,B))-(P(RT,A) – P(RT,B))]
- Limit ability of market participants to move congestion between day-ahead and real-time markets through unilateral actions
  - Many convergence DEC and INC bids around market clearing price makes it more difficult any individual bidder to move congestion charges

Goals of Convergence Bidding (CB)

- Market efficiency benefits of convergence bids
  - A supplier or load with superior information can use convergences bid to commit generation unit in DA needed to meet real-time demand
  - Virtual supply can also displace physical supply if market participant believes that real-time demand will be sufficiently low so that a unit is not required
- In both of these circumstances, convergence bidding can reduce the total cost of meeting demand in real-time

Benefits and Costs of Greater Granularity

- More beneficial uses of convergence bidding with greater granularity
  - Generators that schedule in DA market can use virtual transactions to sell at RT price
    - Schedule 50 MWh in DA market and buy 50 MW of virtual demand in DA market
    - Produce 50 MWh which is sold at RT price
  - Clear DA Congestion Revenue Rights (CRR) in RT market
    - Suppose market participant holds10 MWh CRR from A to B
      - CRR revenue stream is ($P_B - P_A$) from DA market
    - Buys 10 MW of virtual demand at B and sells 10 MW of virtual supply at A
      - Payoff of combined CRR and virtual transactions is ($P_B - P_A$) from RT market
  - Actions ensure nodal price and congestion convergence between DA and RT markets
- These uses of convergence bids are not possible with LAP-level virtual bids
  - LAP-level bidding can only make DA and RT LAP prices converge
  - Large and systematic differences between nodal prices can persist

Benefits and Costs of Greater Granularity

- More potential harm from convergence bidding with greater granularity
  - Seller's choice contracts issue
    - Use convergence bids to reduce price at seller's choice delivery node or increase DA physical deliveries beyond what is physically feasible.
  - Local market power mitigation mechanism
    - Virtual transactions can prevent bids of physical units from being mitigated
- Virtual bids can be used to make CRRs more valuable
  - Increase magnitude of congestion and payments from CRR ownership
- Outstanding design issues associated with more granular convergence bidding
  - Interaction of LAP pricing mechanism with nodal clearing of convergence bids
  - Setting level of position limits for nodal convergence bids
  - Implementing uninstructed deviation penalties with nodal convergence bids

Benefits and Costs of Greater Granularity

- Addressing market power problems with nodal convergence bids
  - Apply local market power mitigation with physical offers from generation units and ISO load forecast
  - Set position limits on bids and offers at individual nodes based on P(max) and peak demand at that node
    - 10 percent of P(max) or peak demand for each market participant
  - Position limits do not prohibit market participants from taking larger positions at a given node
    - Market participant must use bilateral market to purchase a larger position
    - Seller in bilateral market can use ISO markets, up to its position limit, to hedge this risk

Benefits and Costs of Greater Granularity

- Position limits on bids and offers can be increased as ISO and market participants gain greater confidence with nodal convergence bids
- Gradual transition from 10 percent to no position limits at individual nodes
  - Because problems at smaller position limits are likely to get worse at higher position limits, this strategy is appropriately cautious
- Alternative strategy--Start with LAP-level convergence bidding and transition to greater granularity
  - Downside of this approach
    - No problems at LAP level does not mean that significant problems won't arise with greater granularity
    - Limited benefits from LAP-level convergence bidding, particularly for generation unit owners and energy traders
      - LAP level CB volume may not be predictive of nodal level CB volume

Cost Allocation for CB

- Symmetry in cost allocation to physical and virtual load is a useful principle subject following caveats
- Allocating DA and RT market uplift costs and residual unit commitment (RUC) costs to convergence bidders can run counter to CB goals
  - Larger transactions costs for CB implies less CB will occur and less likely price convergence occurs
- CB, particularly at nodal level, can reduce uplift and RUC costs
  - Submit DEC CB to ensure unit dispatched in DA market which reduces need for RUC

Cost Allocation for CB

- Allocating ancillary services costs to virtual load
  - DEC CBs can reduce need to purchase AS
  - Increases transactions costs of CB
  - INC CBs can increase need to purchase AS
- Overall cost allocation conclusion--Keeping transactions costs of CB as low as possible consistent with achieving goals of CB
  - Argument for introducing asymmetric treatment of physical and virtual transactions
- Cost of CB determines maximum average price and congestion difference between DA and RT

A Possible Way Forward

- Nodal CB with very cautious position limits that can be raised with ISO Board approval
  - Start with 10% P(max) and peak demand
- Relatively small charge for convergence transactions relative to physical transactions
  - Ensure that round-trip (DA and RT costs) of CB transaction is always less that round-trip costs of implicit virtual transactions
  - Lower transactions costs make more convergence bids have a positive expected profit
    - Setting too low a transactions costs may be destabilizing relative to slightly higher charge